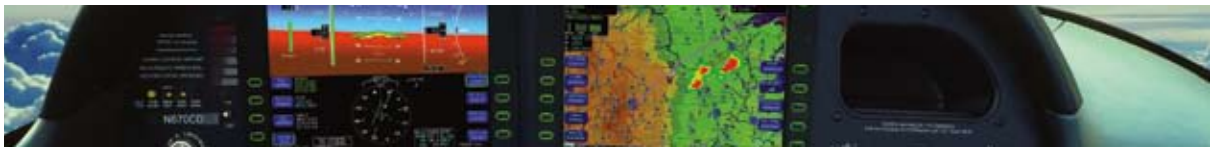


The Glass Menagerie: Getting Comfortable with Integrated Display Technology

BY JAMES WYNBRANDT



Like a modern Cinderella story, general aviation aircraft panels are going from dowdy to dazzling thanks to glass — not glass slippers, but glass-display technology.

“We’re starting to see glass everywhere,” said Jessica Myers, spokesperson for Garmin International, the Olathe, Kan.-based avionics manufacturer. “Now, there’s a way for everybody who wants a glass cockpit to get one.”

With graphic depictions of topography, real-time weather, terrain warnings, traffic alerts, data link and even synthetic vision, integrated glass-panel suites featuring MFDs (multi-function displays) and PFDs (primary flight displays) bring new capabilities and functional-

ity to today’s GA aircraft. But pilots need to master the glass gear before truly realizing their benefits, and some experts say

many flyers aren’t putting enough time into learning.

“Most people know only a fraction of the functions, and utilize only a fraction of them,” said Doug Cayne, vice president of marketing for Aspen Avionics, the Albuquerque, N.M.-based avionics manufacturer.

This lack of understanding isn’t confined to GA pilots, either.

“We’ve had pilots who have operated (our equipment) for years, but never took training,” said Paul DeHerrera, vice president of marketing and product support for Universal Avionics Systems Corp., the Tucson, Ariz.-

based manufacturer of flight management systems (FMS) and MFDs found in business and commercial jets.

“(The pilots) went to get recurrent training and were shocked to learn the system could do a bunch of work they were doing the hard

way,” DeHerrera said.

The good news is, this lack of “mode awareness,” or understanding of how glass-panel

equipment operates, rarely causes accidents, according to the FAA and the AOPA’s Air Safety Foundation (ASF).

“We have been watching,” said Bruce Landsberg, executive director of the ASF. “We have not seen a lot of accidents where it appears the technology is to blame.”

Accidents in glass-panel-equipped aircraft mirror those in non-glass models, according to the ASF, and are primarily attributable to bad weather, improper maneuvering and the like.

“If pilots were crashing glass (panel-equipped) airplanes where they wandered on approach, that would be an indicator they didn’t know enough about the equipment,” Landsberg said.

New Training Standards

Fortunately, for those transitioning to glass or earning their licenses behind this technology, a wealth of training opportunities exist, thanks to a joint initiative between the FAA and the avionics industry. Called the FAA Industry Training Standards (FITS) agreement, its goal is two-fold: develop



common training standards that obviate the need for ratings or sign-offs to qualify pilots to act as PIC in glass-equipped airplanes; and bring the scenario-based training used in commercial and military aviation to GA.

So, instead of plodding through phonebook-sized user's manuals, pilots can learn about glass equipment through interactive, computer-based training using real-world situations and simulations.

"Train the way you fly; fly the way you train," said Lance Nuckolls, aviation safety analyst for the FAA in Washington, D.C., summing up the ethos of scenario-based training.

Susan Parson, a special assistant in the FAA's Flight Standards' general aviation and commercial division, was involved in developing the FITS program.

"People need to understand, stick and rudder (flying skills) are necessary, but your brain has a much larger role to play in this kind of flying," she said.

Glass-panel training varies with the means of equipment acquisition. If you buy a new glass airplane — a Mooney with a Garmin G1000 avionics suite, or a Cirrus with an Avidyne Entegra integrated flight deck, for example — the aircraft manufacturer provides training, which includes rigorous attention to the avionics package.

If you have glass-panel equipment installed in a retrofit, the manufacturer of the equipment will provide instruction material, which might include downloadable demos and tutorial software, online and telephone technical support, regional classes and seminars, and one-on-one

training. For example, Chelton Flight Systems, the Boise, Idaho-based glass-equipment manufacturer, gives retail customers a coupon good for five hours of dual instruction with a Chelton-approved CFII.

If you buy a used aircraft with a glass panel, you will be responsible for your own training, but here again, a wealth of instructional assistance is available. If the glass panel is original

tutorials before buying to ensure you choose the equipment with which you're most comfortable.

Glass is in Session

Understanding a PFD with an electronic depiction of the basic six-pack flight instruments is no problem for a pilot. The real challenge is learning how to operate the FMS system behind the glass panel. Experts say the first training task for anyone going glass is



Photo courtesy of Chelton Flight Systems

equipment, you can get training materials from the aircraft manufacturer.

Cirrus, for example, developed a web-based, glass-panel transition course in partnership with Jeppesen. For a reasonable fee, anyone — including someone buying an Entegra-equipped used Cirrus — can purchase the online training program.

If you rent a glass-panel-equipped aircraft, the FBO likely will mandate dual instruction with a pilot familiar with that glass system, or proof of your proficiency.

If you are considering a retrofit installation, check out demos and

grasping how a particular system "thinks."

"I stress the importance of understanding the basic conceptual organization of the system," said Parson, who also is a CFII and conducts flight training in glass cockpits for the Civil Air Patrol's Virginia Wing.

"We always encourage people to become familiar with the theory of operation before they get here," said Ian Bentley, vice president of customer relations for Cirrus Design, which trains new owners in the glass technology when they pick up their aircraft at the company's factory in

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Duluth, Minn.

Once a pilot understands the system's logic, experts say he or she needs to become proficient in the following operations: loading a flight plan; modifying or editing a flight plan; suspending a flight plan — in case the pilot is given a hold, for example; and intercepting a radial.

Lastly, pilots need to know how to load and fly an approach, and execute a missed approach. These last operations take particular attention because an FMS can have several approach modes, creating possible confusion during this critical flight phase.

"If they know one Garmin box, people seem fairly comfortable with basic VFR functions," Parson said. "But people probably underestimate the challenge of using them for IFR. There are a lot of nuances."

This is not the kind of education that lends itself to on-the-job training.

"Somebody should become familiar with the system in VFR conditions before they go on IFR flights," said Gerry Block, founder and CEO of Vista, Calif.-based Sandel Avionics.

"Even something as simple as TAWS (terrain avoidance warning system) — they should study the flight manual before relying on it in flight," he said.

The amount of data glass gear is capable of presenting also can be overwhelming. But integrated systems provide one-button solutions to get pilots back to a comfortable place on the panel.

Avidyne's "declutter" button, for example, returns the PFD screen to the standard six-pack instrument configuration (albeit



Photo courtesy of Cirrus/Avidyne

with vastly improved presentation over non-virtual gauges).

"It's a real advantage if a pilot gets off in a corner," said Tom Harper, spokesperson for Avidyne.

For more information and training resources, the ASF has free online instruction programs for glass-panel equipment on its website at www.aopa.org/asf/online_courses. The FAA also maintains a list of online instructional resources on its website at http://faasafety.gov/gslac/online_resources.aspx.

Learn At Your Own Speed

How much time should it take a pilot to master a glass panel? That depends on the pilot and the system. Individual pilots find some glass suites more intuitive and easier to learn than others. And pilots differ in the slope of their learning curves.

"Each individual absorbs information at different speeds," DeHerrera said.

"It's really dependent on the individual," Myers agreed.

However, once a pilot has a basic understanding of the system, there's no substitute for getting in the airplane and trying it out.

"You almost have to experience it, then you can come back with smarter questions," Bentley said.

Myers said she doesn't "know a pilot who hasn't done a long cross country, flying along and pushing buttons to see how the equipment operates."

"Often, just having the time to do that and being willing to do that is what it takes," she said.

But, as each manufacturer's equipment differs in the way it thinks and operates, familiarity with one system does not translate into universal glass-panel competence.

"Don't think you can get in (an aircraft equipped with an unfamiliar glass panel) without a fair amount of practice and training," said Parson, recalling an orientation flight she made in an aircraft with glass-panel equipment she had never operated before. "I would have busted an IFR check ride for sure."

Glass training isn't like learning to ride a bicycle, either. The knowledge is perishable. Take advantage of the equipment's simulator capabilities to brush up on skills as needed.

"If you're about to go into hard IFR, take an extra five or

10 minutes prior to takeoff, put (the unit) into simulation mode, and fly the departure and the approaches you're about to use," said Nick Cain, director of training for Chelton Flight Systems. "Rehearse the button pressing."

The Education of a Lifetime

GA pilots can expect to see more powerful integrated glass-panel systems as the technology advances and costs decline.

"We'll look back five years from now at stuff that's state-of-the-art today and say, 'That's pretty antiquated,'" Landsberg said.

One example: Honeywell Aerospace, which designed its high-end Primus Epic glass panel for Part 25 (transport category) aircraft, has created a less costly version, the Primus Apex, for GA aircraft, and it's being installed in new Pilatus PC-12 aircraft.

"New functionality will be brought to the cockpit, with airport maps, runway guidance, increased situational awareness and synthetic vision," said Sergio Cecutta, product manager for Honeywell Aerospace.

"At the same time, we're trying to make sure we don't add complexity to the system, so the data is seamlessly integrated in the cockpit," he said.

As it finds its way into GA aircraft, glass-panel equipment not only will transform the way pilots fly, but also the way they learn.

"A focus on training and self-learning traditionally have not been a factor in our industry," Cayne said. "It will be more and more a requirement, particularly in the retrofit market."

Bentley said training isn't an event, it's a process. "The terminology that's becoming most

widely used is 'lifelong learning,'" he said.

Yet, the more things change, the more they stay the same. As pilots become proficient in exploiting the capabilities of glass-cockpit systems, experts say they will need to guard against overconfidence.

"Sometimes people believe they have a silver bullet," Parson said. "They think, 'I have all this equipment and capability, and I'm bulletproof.' But they're not. It's all about risk management."

Perhaps in recognition of this mindset, Cirrus has added a screen to the start-up menu in its Entegra installation with a self-test for pilots to assess their readiness for the flight they're about to undertake.

"There's no such thing as a go-anywhere, anytime airplane," Bentley said. "More and more, we see the challenge in flight training today is about the go/no-go decision or the en route equivalent. The real challenge is how to help people avoid situations where they have to do their heroics.

"It's the old adage: A superior pilot uses superior judgment to avoid using superior skills." ■



Photo courtesy of Cirrus/Avidyne